

**NEW SPECIES OF *GRILLOTTIA* AND *PSEUDOGRILLOTTIA*
(CESTODA: TRYPANORHYNCHA) FROM AUSTRALIAN SHARKS, AND
DEFINITION OF THE FAMILY GRILLOTTIIDAE DOLLFUS, 1969**

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Summary

CAMPBELL, R. A. & BEVERIDGE, I. (1993) New species of *Grillotia* and *Pseudogrillotia* (Cestoda: Trypanorhyncha) from Australian sharks, and definition of the family Grillottiidae Dollfus, 1969. *Trans. R. Soc. S. Aust.* 117(1), 37-46, 4 June, 1993.

Two new species of trypanorhynch cestodes *Grillotia amblyrhynchos* sp. nov. and *Pseudogrillotia spratti* sp. nov., are described from the spiral valves of carcharhinid sharks in Australian waters. *G. amblyrhynchos* is distinguished from congeners by possessing seven hooks per principal row, four intercalary hooks that merge with a wide longitudinal band of small hooks on the external tentacular surface, and a basal armature with microhooks on the external surface. *Pseudogrillotia spratti* sp. nov. is the fourth species in the genus and differs from congeners in the absence of a basal swelling, lack of a pars post-bulbosa, 9-10 hooks per principal row, absence of a band of hooks from all but the basal region of the tentacle and a single row of intercalary hooks. The subfamily Grillottiinae Dollfus, 1942 and the family Pseudogrillottiidae Dollfus, 1969 are discussed. The subgenus *Paragrillotia* and family Pseudogrillottiidae are rejected. Grillottiidae Dollfus, 1969 is formally defined for the first time and the three genera, *Grillotia* Guiart, 1927, *Progrillotia* Dollfus, 1969 and *Pseudogrillotia* Dollfus, 1969 are admitted with revised diagnoses.

KEY WORDS. *Grillotia*, *Pseudogrillotia*, cestode, new species, Australia.

Introduction

Few records of *Grillotia* or its relatives exist from studies of the cestode parasites of Australian fishes. Three *Grillotia* species have been described from larvae taken from Australian teleosts, one by Shaharom & Lester (1982) and two by Sakanari (1989). The genus *Pseudogrillotia* was not listed as occurring in the Australian region in a checklist of the parasites of fishes by Beumer *et al.* (1982). A new species of *Pseudogrillotia* from a carcharhinid shark reported herein therefore constitutes the first record of this taxon in the Australian region and a new species of *Grillotia* represents the first description of an adult of this genus from the region.

Materials and Methods

Cestode specimens were fixed in 10% formalin and transferred to 70% ethanol for storage. Tentacles were dissected free and mounted in glycerine jelly or balsam to facilitate examination. Whole mounted cestodes were stained with Celestine Blue, dehydrated in a graded ethanol series, cleared in clove oil and mounted in Canada Balsam. Terminology and numbering of tentacular hooks follows Dollfus (1942).

Measurements are given in micrometers as the range followed by the mean in parentheses, unless otherwise

indicated. The number of measurements is indicated as (n). All specimens were measured. Type specimens have been deposited in the South Australian Museum, Adelaide (SAM).

Drawings were made with a drawing attachment on an Olympus BH microscope. In the figures, vitelline follicles are shown only along the lateral margins of proglottides for the sake of clarity.

***Grillotia amblyrhynchos* sp. nov.**

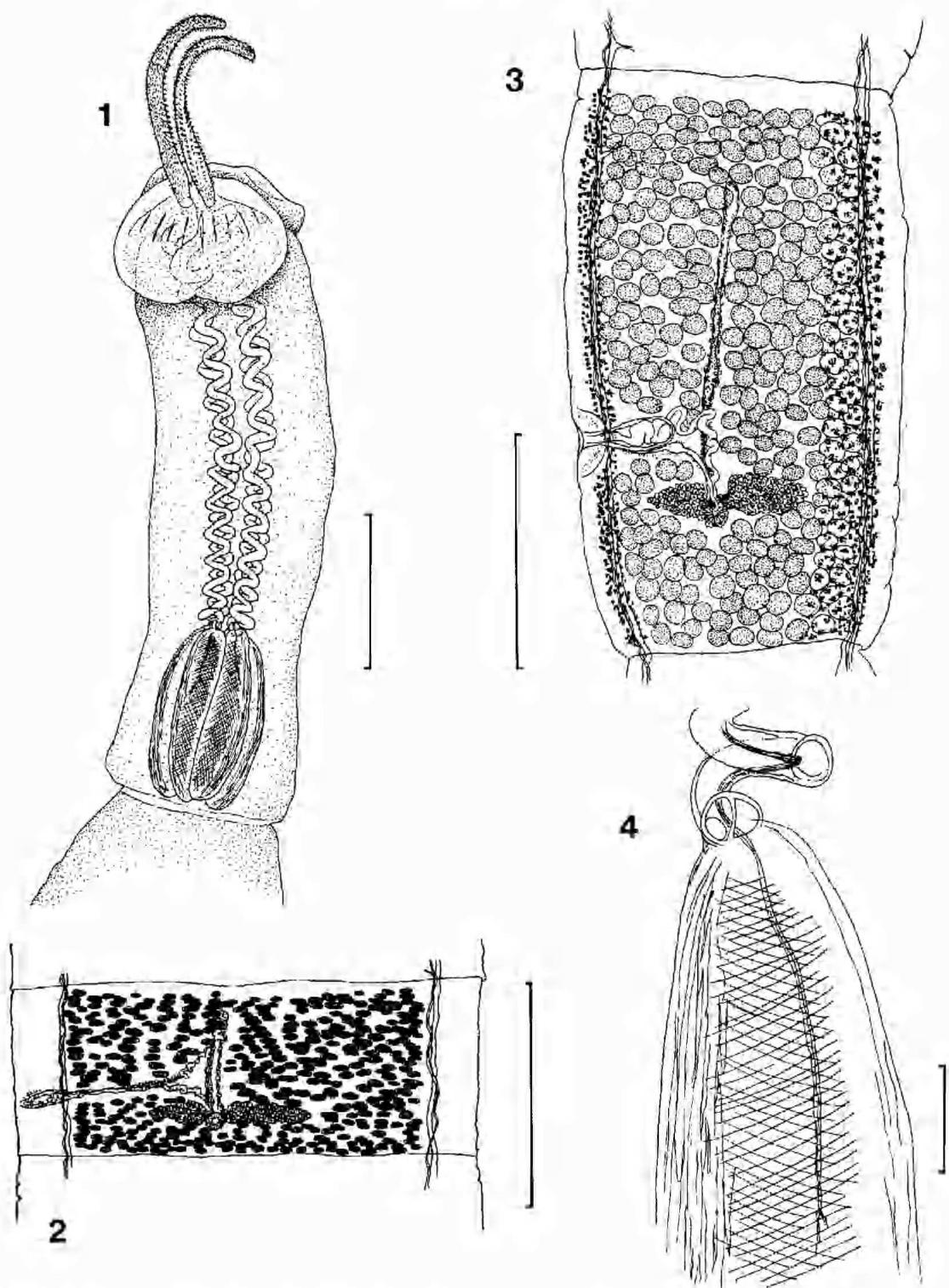
FIGS 1-9

Types: Holotype: from spiral valve of *Carcharhinus amblyrhynchos* (Bleeker, 1856), Townsville, Queensland, 4.xii.1985, coll. B. G. Robertson, SAM V4213; paratype: 1 specimen, same date, SAM HC23332.

Description: Moderate sized worms, total length up to 30 mm. Scolex (n=2) long and broad, 3.9, 4.2 mm long, 1.18 mm wide at level of bulbs. Two broadly oval, patelliform bothridia, 710-900 (780) long by 1070-1180 (1120) wide, notched on posterior border, margins only slightly thickened and curved medially, posterior and lateral borders free; adherent surface spinose with a narrow median fissure c. 266 long, paralleled by four smaller fissures on either side at regular intervals (Fig. 1). Pars vaginalis 2.56, 2.74 mm long. Tentacle sheaths spiral; prebulbar organs distinct. Bulbs 1140-1180 long by 232-264 in diameter; retractor muscle originates at midlength of bulb. Pars post-bulbosa lacking. Ratio of pars bulbosa to pars vaginalis 1:2.3

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Figs 1-4. *Grillotia amblyrhynchos* sp. nov.; 1, scolex; 2, immature proglottis showing testes; 3, mature proglottis, vitellaria shown only at margins; 4, bulb and prebulbar organs. Scale lines: 1-3, 1 mm; 4, 0.1 mm.

to 1:2.4. Scolex ratio (pbo:pv:phub) 1:3.3:1.4. Tentacles short, length 1.40-1.46 mm, tapering, tending to collapse; diameter at base 110-114, diameter at mid-tentacle 95, diameter at tip 34. Armature heteroacanthous (*sensu* Beveridge & Campbell 1989), heteromorphous, with band of small hooks in metabasal region; hooks hollow. Basal armature consists of numerous microhooks on external face between first four principal rows of hooks (Fig. 6); internal face of basal armature consists of large hooks, reduced in size from those of metabasal region. Principal hook rows alternate, consist of ascending half-spirals of seven hooks each; rows begin on internal surface, merge with band of small hooks on external surface of tentacle (Fig. 8). Hooks of first proximal row (base of tentacle) reduced in size and number; hooks 1(1') of first proximal row well separated but with transverse bases. Hooks 10(1') in all other rows, separated by distinct space, bases oriented longitudinally, rose-thorn shaped, gradually increasing to maximum size at mid-tentacle then decreasing in size toward tip of tentacle, length 36-63 (52), base 34-46 (41), with distinct heel 4-11 (9) and toe 4-13 (10), height 23-38 (32) (n=10). Hooks 2(2') rose-thorn shaped, similar to 1(1') but smaller, length 36-49 (42), base 27-38 (31), heel 8, toe 9, height 19-29 (23). Hooks 3(3') erect, falciform, with extended heel 4-6 (5), toe absent, hook length 34-44 (39), base 19-23 (22), height 22-30 (27). Hooks 4(4') and 5(5') falciform, erect slightly smaller, heel reduced, toe lacking; 4(4') length 29-42 (38), base 10-15 (13), heel 4, height 17-23 (24); 5(5') length 23-25 (24), base 11, heel 2, height 17-24 (20). Hooks 6(6') and 7(7') spiniform, smaller in proximal rows 1-4, length 10-15, but with distinct toe 4-6; toe absent from these hooks distal to row 4; 6(6') length 17-21 (19), base 10, height 11-19 (15); 7(7') length 15-21 (16), base 8-10 (9), height 13-18 (16). Hooks 6(6') and 7(7') of principal rows much reduced and merge with band of hooks on external surface of tentacle. Viewed from bothridial or antibothridial surfaces of metabasal region, single row of 3-4 intercalating hooks between principal rows beginning with hooks 4(4') or 5(5'). Second intercalary row of two hooks may be present between principal rows in basal region of tentacle. Intercalary hooks spiniform, length 11-19 (15), base 5-6 (5), height 6-16 (10). Intercalary hook rows merge with irregularly arranged band of hooks on external surface. Band of hooks opposite proximal rows 1-10 small, uncinate, length 8-13 (10), base 4-6 (5), height 4, toe 4. Remainder of hooks forming band distal to row 10 spiniform, length 11-21 (18), base 4-8 (6), toe absent, heel 2, height 11-19 (17).

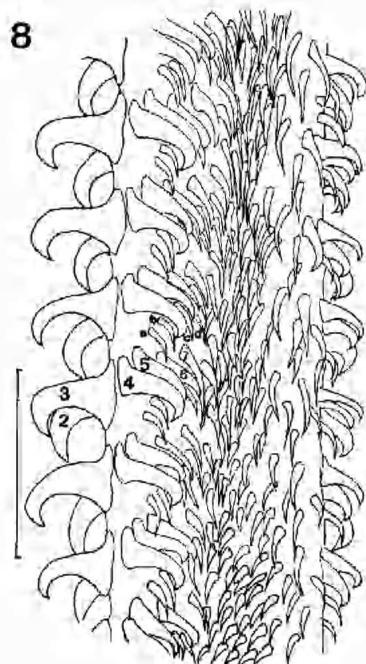
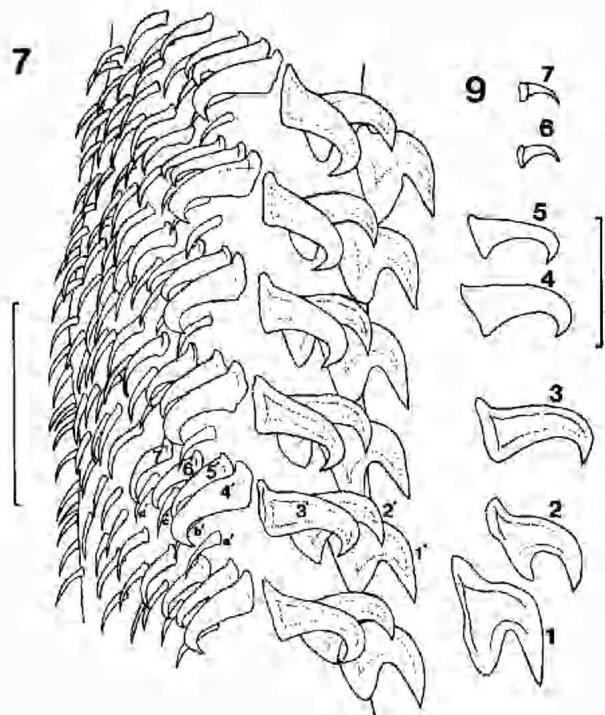
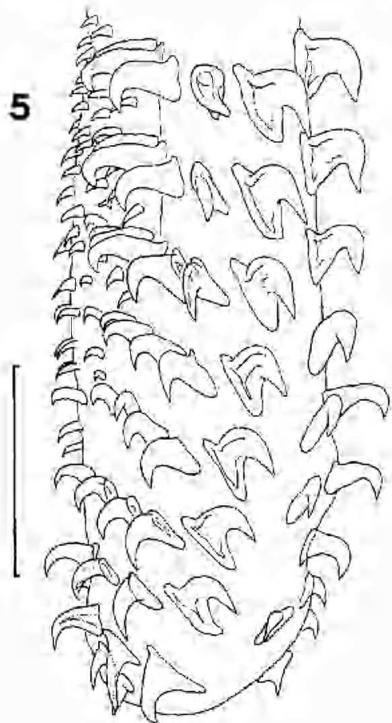
First evidence of segmentation about 680 from scolex, segments narrow, gradually increasing in length with maturity, becoming twice as long as wide when mature. Mature segments acraspedote, 1.92-2.36 mm (2.22 mm) by 1.40-1.50 mm (1.45 mm), terminal

segments c. 2.50 mm by 1.44 mm. Genital pores lateral, irregularly alternate, post-equatorial, 60-64 percent of segment length from anterior margin in mature segments. Cirrus (or possibly an hermaphroditic) sac pyriform, 258-400 by 133-140, containing sinuous sperm duct. No armature visible. External seminal vesicle not observed. Testes subspherical, 200 by 180, numerous, about 376-532 (420) in mature segments, occupying all available space medial to osmoregulatory canals including postovarian space. Vagina narrow, surrounded by gland cells, closely parallels posterior border of cirrus sac, forming a bulbous dilatation ventral to proximal pole of cirrus sac, then turns posteriorly at midline as dilated tube and extends to ovarian isthmus to form narrow fertilization duct. Ovary 144-176 by 656-728, subterminal, consisting of two small, transversely elongated asymmetrical lobes joined by short isthmus, poral lobe smaller, lobes subdivided into numerous lobules. Mehlis' gland immediately posterior to ovarian isthmus, c. 144 in diameter. Vitellarium follicular, forming layer encircling osmoregulatory canals and reproductive organs. Uterus simple, median tube, terminating in anterior one-fifth of segment. Ventral osmoregulatory canal largest, diameter 38; dorsal osmoregulatory canal extremely narrow, sinuous, diameter 2.

Etymology: The species is named after its host, *C. amblyrhynchos*.

Remarks: Presently, there are 20 valid species of *Grillotia* (see Sakanari 1989).

G. amblyrhynchos sp. nov. has characters of the subgenus *Paragrillotia* which Dollfus (1969a) created to accommodate species of *Grillotia* in which the band of hooks could not be distinguished from the adjacent intercalary rows (i.e. the intercalary rows merged with the band of hooks). Only two species have been attributed to the subgenus *Paragrillotia*, *G. (Paragrillotia) simmonsi* Dollfus, 1969 and *G. (Paragrillotia) rowei* Campbell, 1977. Cairns & Gavarrino (1989) provided a redescription of *Rhynchobothrium simile* Linton, 1900 and showed that *G. (P.) simmonsi* Dollfus, 1969 was a junior synonym of it. They proposed the new combination *G. similis* but did not discuss Dollfus' (1969a) placement of the species, now recognized as *G. similis*, in the subgenus *Paragrillotia*. Conceptually, the creation of *Paragrillotia* as a subgroup of *Grillotia* is useful except for the fact that *G. simmonsi* does not fit the subgeneric definition. *Grillotia (P.) rowei* was the first species described that met the subgeneric definition (Campbell 1977). *G. amblyrhynchos* sp. nov. is a second species with this subgeneric character. The problem is not resolved by retaining *G. simmonsi* as type of the subgenus *Paragrillotia*. *Paragrillotia*, then, should be eliminated on the basis of its chosen type species.



Figs 5-9. *Grillotia amblyrhynchos* sp. nov.; tentacular armature: 5, basal region, internal face; 6, basal region, external face; 7, metabasal region, bothridial face; 8, metabasal region, external face; 9, hooks 1 through 7 of principal row. Scale lines: 5-8, 0.1 mm; 9, 0.05 mm.

Both *G. similis* and *G. rowei* have six hooks per principal row unlike *G. amblyrhynchos* sp. nov., which has seven hooks per principal row. None of the remaining species of *Grillotia* has seven hooks per principal row (Sakanari 1989). In *G. similis* and *G. amblyrhynchos* there are four hooks per intercalary row. There are two or three intercalary hooks per row in *G. rowei* but the hooks have transversely elongated bases whereas those of *G. amblyrhynchos* are oval and have a longitudinal orientation. In *G. similis*, the first two intercalary hooks in each row (a and b) are twice the length of intercalary hooks c and d whereas in *G. amblyrhynchos* the intercalary hooks are subequal. The group of microhooks on the external face of the basal armature of *G. amblyrhynchos* is absent in *G. similis* and *G. rowei*. The presence of microhooks in the basal armature is typical of 15 species of *Grillotia*.

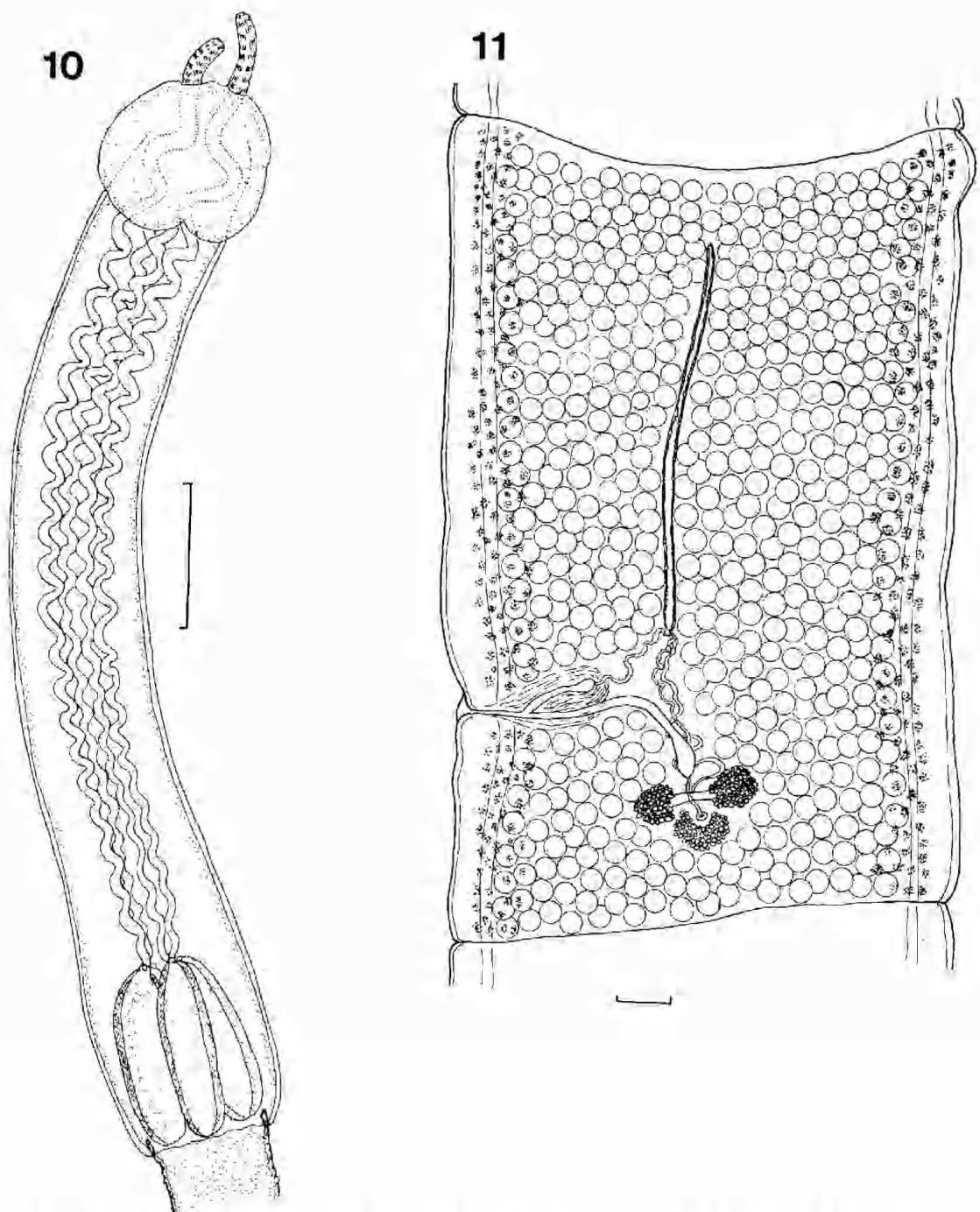
Differences in the numbers of hooks across the bands of these species is worthy of note. In *G. similis* only a single hook file remains between the intercalary rows and principal rows on the external face (See Fig. 8, Caira & Gavarrino 1989). In Fig. 19 of Dollfus (1969a) the band of hooks of *G. simmonsi* is reduced to 1-3 hooks in width if one disregards all the principal hooks and intercalary hooks. Therefore, the characteristic feature for the subgenus *Paragrillotia* of having the intercalary rows merge imperceptibly with the "band" of hooks is misleading because there is only a single file of hooks rather than a band exclusive of the intercalary and principal rows. In fact, this armature pattern demonstrates an intermediate pattern of symmetry between atypical heteroacanths and pucciloacanths with a single chainette. In *G. rowei* a single large hook and two small hooks are present on each side of the external face between the opposing principal rows and in *G. amblyrhynchos* a band 6-8 spiniform hooks in width is present. The mature proglottides of *G. similis* and *G. amblyrhynchos* possess postovarian testes, a feature Dollfus (1969b) considered significant in separating *Progrillotia* from *Grillotia*. An hermaphroditic sac was noted in *G. erinaceus* by Dollfus (1942), and this feature has been confirmed by us in additional material of the species. It was also shown to occur in *G. similis* by Caira & Gavarrino (1989). Beveridge & Campbell (1988) have pointed out the presence of an hermaphroditic sac in numerous trypanorhynchs and have remarked upon the generic and even familial significance of the genital terminalia.

Pseudogrillotia spratti sp. nov. FIGS 10-16

Types: Holotype: from spiral valve of *Carcharhinus brachyurus* (Guenther, 1870), Tathra, N.S.W., 31.xii.1984, coll. D. M. Spratt, SAM V4212;

paratypes: four specimens, same data AHC HC23331. **Description:** Scolex craspedote, very long and slender, 6.2-8.4 mm (7.4 mm; n=5) long, maximum width 0.88-1.16 mm (1.00 mm) in region of bulbs; two patelliform bothridia, 740-980 (880) wide, posterior margin indented, with a pair of fissures on lateral margins. Pars bothridialis 0.88-1.00 mm (0.95 mm); tentacle sheaths regularly sinuous; pars vaginalis 5.6-7.1 mm (6.4 mm); bulbs short and wide, 1.12-1.28 mm (1.21 mm) long by 220-340 (270) wide; prebulbar organs prominent; retractor muscle origin undetermined. Pars postbulbosa absent. Velum very short, 30-80 (50). Scolex ratio (pb): (pv: phub): 1: 6.7-1.3. Tentacles up to 1.2 long, 70-140 (110) in diameter, basal swelling lacking. Armature heteroacanthous, heteromorphous; hooks hollow. Principal rows of hooks alternate, ascending in half spirals of 9-10 hooks per row from external surface. Hooks 1(1') separated by a wide space, rose-thorn shaped, large, 70-100 (85) long, base length 60-70 (65), height 40-60 (50, n=10); hooks 2(2') rose-thorn shaped, smaller, 60-75 (70) long, base 40-60 (45), height 55-80 (66). Hooks 3(3') to 9(9') elongate, slender, bases narrow, gradually diminishing in size, recurved at tip; 3(3') length and height 65-85 (77), base 15-35 (25); 4(4') length and height 70-90 (84), base 15-30 (23); 5(5') length and height 65-80 (72); 6(6') length and height 60-80 (65); 8(8') length and height 45-80 (62); 9(9') length and height 48-70 (62); 10(10') length and height 44-56 (49). Single row of six intercalary hooks, 20-32 (23) long, present between principal rows aligned with principal hooks 5(5') to 10(10'). In basal region, principal hooks of bothridial surface larger than those of antithoridial surface; ascending series of six hooks in file number 1, lengths 72, 55, 60, 70, 90, 95; hooks in file number 1', lengths 100, 90, 85, 90, 95. Internal surface of basal armature with band of small microhooks, 12-28 (16) long, extending in closely spaced V-shaped rows along tentacle but ending at level of fifth principal rows; band of microhooks diminishes from 12 hooks wide proximally at first principal rows to four hooks distally at fifth principal rows; band of hooks absent distal to fifth principal row of hooks.

Longest specimen 50 mm, with about 65 segments; first mature segment about number 50. Segments craspedote, largest mature segment 1.8 mm by 0.97 mm; genital pore in posterior half of segment, 80% from anterior margin; irregularly alternate. Testes numerous (> 500), filling all available intervascular medullary space, forming thick postovarian band, 40-60 (50, n=10) in diameter; vas deferens visible at level of ovarian isthmus, coils extending just anterior to level of genital pore then laterally to enter cirrus sac. Hermaphroditic sac weakly developed, about 230 by 90; external seminal vesicle present, weakly developed. Vagina tubiform, diameter about 20, joining



Figs 10-11. *Pseudogillotia spratti* sp. nov.; adult worm: 10, scolex; 11, mature segment. Scale lines: 10, 1 mm; 11, 0.1 mm.

cirrus within hermaphroditic sac to form hermaphroditic duct. Vagina curves posteriorly to ovarian isthmus, dilating to 40 but not forming distinct seminal receptacle. Ovary immature, lobes 150 by 80. Mehlis' gland posterior to ovarian isthmus, 160 by 90; uterine duct coils anteriorly nearly to level of hermaphroditic sac; uterus tubular, ascends anteriorly nearly to anterior end of segment, uterine pore absent. Vitelline follicles form a circum-medullary sleeve around proglottis. Lateral osmoregulatory canals barely visible.

Remarks: Dollfus (1969a) created the genus *Pseudogri洛tia* and the family *Pseudogri洛tiidae* for *P. pleistacantha* because of its combination of two bothridia, craspedote scolex, metabasal armature with a band of numerous small hooks, lack of a chainette and possession of a postlarval stage. Carvajal *et al.* (1976) added a second species, *P. basipunctata*, from *C. amblyrhynchos* in Hawaii. *P. spratti* sp. nov. is similar to *P. pleistacantha* in the number of hooks per principal row and lack of a basal tentacular swelling but can be distinguished from *P. pleistacantha* by (1) lack of a continuous band of small hooks in the metabasal armature and (2) lack of a pars post-bulbosa and velum. The new species can be distinguished from *P. basipunctata* by (1) the lack of a continuous band of hooks in the metabasal armature, (2) lack of a well developed basal armature, (3) absence of a basal swelling and (4) more hooks per principal row (9-10 vs. 6).

P. peruviana described by Escalante & Carvajal (1984) is most similar to *P. spratti* sp. nov. in having the band of hooks restricted to the basal region of the tentacle but is readily distinguished from the new species by (1) possession of four intercalary hook rows between each pair of principal rows compared with one intercalary row in *P. spratti*, and (2) differences in the shape of the large basal hooks (Fig. 14).

Carvajal *et al.* (1976) emended the family diagnosis of *Pseudogri洛tiidae* with the description of the first species based upon an adult worm. The diagnosis is still in agreement with *P. spratti* and *P. peruviana* except that, as in species of *Pterobothriidae*, viz. *P. harwicensis* Carvajal Cornford & Campbell, 1976, the band of hooks may be absent from the metabasal armature. All other characters are in agreement.

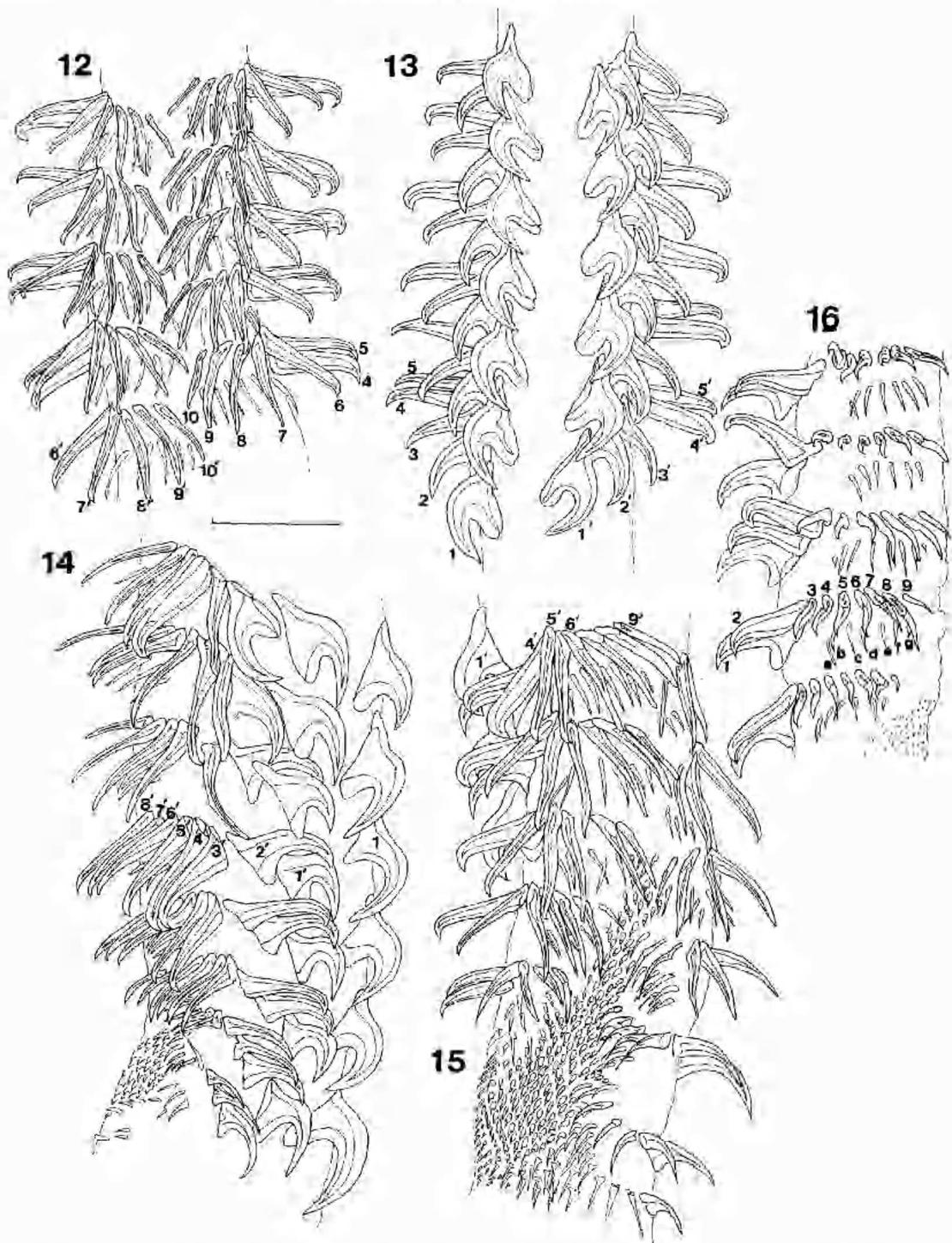
Discussion

Trypanorhynch cestodes of the subfamily *Grillotiinae* Dollfus, 1942 and the family *Pseudogri洛tiidae* Dollfus, 1969 have been reported from sharks and skates in the Mediterranean, North Atlantic, off the west coast of both North and South America, Hawaii and recently from Australian waters. Dollfus (1942) created the subfamily *Grillotiinae* within the family

Lacistorhynchidae Guiari, 1927 distinguishing it from other poeciloacanths with two bothridia by (1) possession of a longitudinal band of hooks instead of a chainette and (2) presence of intercalary hooks between the principal rows. He further noted the possession of two notched patelliform bothridia, acraspedote scolex and lack of a postlarval stage (without blastocyst). In a separate paper, Dollfus (1946) created the subgenus *Progrillotia* to accommodate a new species that lacked postovarian testes and later (Dollfus 1969b) elevated *Progrillotia* to generic status with an emended diagnosis, distinguished from *Grillotia* by very long bulbs, no enigmatic prebulbar organs, absence of postovarian testes and a external band of hooks that is discontinuous but merges with the interpolated rows of hooks. Dollfus (1969a) also created the subgenus *Paragri洛tia*, and the family *Pseudogri洛tiidae*.

Dollfus (1969a) emphasized the distinction between the armatures of *Grillotia* and *Lacistorhynchus* by erecting a new family *Grillotiidae* because it separated genera with chainettes (*Lacistorhynchus*, *Callitetrarhynchus*, *Flariceps*, *vide* Beveridge & Campbell 1989) from genera with intercalary rows and a longitudinal band of hooks on the external surface, i.e. *Grillotia*. Dollfus' (1969a) distinction stands in contradiction to the keys of Yamaguti (1959) and Schmidt (1986). We agree with Dollfus (1969a) and recognize a further distinction of the armature possessed by grillotiids as being suitably accommodated by the definition of "atypical heteroacanthous" in which "there are more rows of hooks on the external face than on the internal face (of the tentacle)". Our interpretation of trypanorhynch armatures includes the *Grillotiidae*, *Pterobothriidae*, *Molicolidae*, *Otobothriidae* and *Rhinoptericolidae* as atypical heteroacanths thus separating those families with intercalary rows and longitudinal "bands" of hooks from their former classical inclusion with the poeciloacanthous families possessing chainettes. In our opinion the term "poeciloacanth" is best restricted to families with chainettes, as defined by Beveridge & Campbell (1989), and considered distinct from those with longitudinal "bands". Thus, the poeciloacanthous ("chainette") families are *Dasyrhynchidae*, *Lacistorhynchidae*, *Hornelliellidae*, *Mustelicolidae*, *Gymnorhynchidae*, and *Mixedigmatidae* (see Beveridge & Campbell 1989).

Dollfus' attempts (1969a) to subdivide species of *Grillotia* have been prompted by their rather homogeneous armatures and varied combinations of other scolex features. He created the subgenera *Grillotia*, *Progrillotia*, and *Paragri洛tia*. *Paragri洛tia*, discussed and rejected above, remained a subgenus. *Progrillotia* Dollfus, 1946 was elevated to generic status and a new genus and family, *Pseudogri洛tia*



Figs 12-16. *Pseudogrilloia spratti* sp. nov.; tentacle armature: 12, metabasal armature, external surface; 13, metabasal armature, external surface showing origin of principal rows; 14, basal region, internal surface on right side and bothridial surface at left; 15, basal region, transition between the basal armature and metabasal region on the external surface; 16, lower metabasal region, antithoridial surface showing single intercalary row of hooks. Scale lines: 12-16, 0.1 mm.

(Pseudogrillottiidae) were added by Dollfus (1969a). Schmidt (1986) included the genus *Grillotia* and *Pseudogrillotia* in his key but omitted *Progrillotia* and the family Pseudogrillottiidae. We concur with Schmidt (1986) in considering a craspedote scolex and postlarval stage insufficient to warrant separation of *Pseudogrillotia* into another family. We have found no paper in which Dollfus ever formally defined the family Grillotiidae but he did contrast the Grillotiidae as well as the subfamily Grillotinae (Dollfus 1969a) in the justification for creating *Pseudogrillotia* and the Pseudogrillottiidae.

Despite the increasing number of species described and the variability in the combination of characters now apparent, Dollfus' treatment of the group has remained basically unchanged since 1969. The diverse combinations of characters and taxonomic importance previously attributed to them must be questioned in view of species recently described. The various combinations include patelliform versus non-patelliform bothridia, craspedote or acraspedote scolex, presence or absence of prebulbar organs, long or short bulbs, various origins of the retractor muscle, presence or absence of a postlarval stage between the blastocyst stage and adult, presence or absence of a basal armature, presence or absence of a demarcation between the intercalary hooks and the longitudinal band of hooks on the external surface, and even the interpretation of the presence of a longitudinal "band" of hooks for some species. For the reproductive system the details of the terminal genitalia are not well known but a hermaphroditic sac, combined with an accessory, external and internal seminal vesicles have been shown to occur in several species, the ovary may be terminal or subterminal in position, and postovarian testes are present in some species and lacking in others. As proposed by Dollfus (1942) the sub-family Grillotinae is justified as separate from the Lacistorhynchinae in the lack of a chainette, presence of a longitudinal "band" of hooks in the metabasal armature, and presence of intercalary rows of hooks in the armature. These same characters are implied as supporting elevation to family rank (Dollfus 1969a). Complete revision of the family Grillotiidae should be made based upon examination of types of all species. The diversity of characters and combinations is not unique to *Grillotia*, but many of these same combinations can be found in the Gilquinidae (see Beveridge 1990). We propose that they be accommodated by including them in a formal diagnosis of the family and recognised separately from the Lacistorhynchidae as follows:

Grillotiidae Dollfus, 1969 emended

Diagnosis: Scolex acraspedote or craspedote. Two wide bothridia, cordiform or patelliform, with or without thickened rims, posterior and lateral margins

free. Principal hook rows alternate, intercalary rows of hooks present, irregular band of small hooks between termination of principal rows in metabasal armature. Basal armature present or absent. Hooks heteromorphous, hollow. Pars vaginalis long, tentacle sheath sinuous. Bulbs long or short, prebulbar organs present or absent. Retractor muscle originates in posterior half or bulb. Segments acraspedote, apolytic. Mature segments elongated. Genital pores marginal, irregularly alternate. Accessory seminal vesicle, internal seminal vesicle and hermaphroditic duct present in type species. Hermaphroditic duct, external and internal seminal vesicles reported for some species. Testes medullary, some usually postovarian. Ovary usually separated from posterior segment margin by a space. Vitelline follicles form a continuous sleeve around the internal organs. Uterus saccate with lateral diverticular. Proceroid in copepods, pleroecerci and postlarvae in teleosts, adults in elasmobranchs.

Type genus: *Grillotia* Guiart, 1927

Diagnosis: Grillotiidae, acraspedote scolex; bothridia indented on posterior border, longitudinal "band" of hooks continuous, intercalary rows of hooks may merge with "band", special basal armature absent, prebulbar organs present, hermaphroditic sac present, internal and external (or accessory) seminal vesicles present, ovary well forward, postovarian testes present. Other genera: *Progrillotia* Dollfus, 1969

Diagnosis: Grillotiidae, acraspedote scolex, bothridial margins not indented posteriorly, prebulbar organs lacking, longitudinal "band" of hooks interrupted opposite each principal row, special basal armature may be present, bulbs very long, prebulbar organs lacking, testes in longitudinal rows, accessory seminal vesicle absent, ovary at posterior extremity of segment, postovarian testes absent. Type species: *Pr. pastinacae* Dollfus, 1946.

Pseudogrillotia Dollfus, 1969

Diagnosis: Grillotiidae, craspedote scolex, bothridia indented posteriorly, prebulbar organs present, longitudinal "band" of hooks continuous but may be restricted to basal region, special basal armature absent, hermaphroditic duct present, testes racemose, ovary well forward of posterior margin, postvaginal testes present, postlarval stage in life cycle. Type species: *P. pleistacantha* Dollfus, 1969.

Acknowledgments

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References

- BEUMER, J. P., ASHBURNER, I. D., BURBURY, M. E., JETTE, E., & LATHAM, D. J. (1982) A checklist of the parasites of fishes from Australia and its adjacent Antarctic territories. *Commonw. Inst. Parasitol. Techn. Comm. No. 48* (Commonwealth Agricultural Bureaux, Farnham Royal, England.)
- BEVERIDGE, I. (1990) Revision of the family Gilquiniidae Dollfus (Cestoda: Trypanorhyncha) from elasmobranch fishes. *Aust. J. Zool.* **37**, 481-520.
- & CAMPBELL, R. A. (1988) *Cetorhinicola* n.g., *Shirleyrhynchus* n.g. and *Stragulorhynchus* n.g., three new genera of trypanorhynch cestodes from elasmobranchs in Australian waters. *Syst. Parasitol.* **12**, 47-60.
- & — (1989) *Chimaerarhynchus* n.g. and *Patellobothrium* n.g., two new genera of trypanorhynch cestodes with unique poeciloacanthous armatures, and a reorganisation of the poeciloacanthous trypanorhynch families. *Ibid.* **14**, 209-225.
- CAIRA, J. & GAVARRINO (1989) *Grillotia similis* (Linton, 1908) comb. n. (Cestoda: Trypanorhyncha) from nurse sharks in the Florida keys. *J. Helminthol. Soc. Wash.* **57**, 15-20.
- CAMPBELL, R. A. (1977) New tetraphyllidean and trypanorhynchian cestodes from deep-sea skates in the western north Atlantic. *Proc. Helminthol. Soc. Wash.* **44**, 191-7.
- CARVAJAL, J., CAMPBELL, R. A. & CORNFORD, E. (1976). Some trypanorhynch cestodes from Hawaiian fishes, with descriptions of four new species. *J. Parasitol.* **62**, 70-7.
- DOLLFUS, R. P. (1942). Etudes critiques sur les tétrarhynques du Muséum de Paris. *Arch. Mus. Natl. Hist. Nat. (Paris)* **19**, 1-466.
- (1946) Notes diverses sur les Tétrarhynques. *Mém. Mus. Natl. Hist. Nat.* **22**, 179-220.
- (1969a) Quelques espèces de cestodes tétrarhynques de la côte Atlantique des Etats Unis, dont l'une n'était pas connue à l'état adulte. *J. Fish. Res. Bd Can.* **26**, 1037-61.
- (1969b) De quelques cestodes tétrarhynques (hétéracanthes et pécilacanthes) recueillis chez des poissons de la Méditerranée. *Vie et Milieu*, ser. A **20**, 491-542.
- ESCALANTE, H. & CARVAJAL, J. (1984) Larval trypanorhynch cestodes from Peruvian teleost fishes, with descriptions of two new species. *Stud. Neotrop. Fauna Environm.* **19**, 185-194.
- SAKANARI, J. (1989) *Grillotia heroniensis*, sp. nov., and *G. overstreeti*, sp. nov. (Cestoda: Trypanorhyncha) from Great Barrier Reef Fishes. *Aust. J. Zool.* **37**, 81-7.
- SCHMIDT, G. D. (1986) 'CRC handbook of Tapeworm Identification.' (CRC Press Inc., Florida.)
- SHAHAROM, F. M. & LESTER, R. J. G. (1982) Description and observations on *Grillotia branchi* n. sp., a larval trypanorhynch from the branchial arches of the Spanish mackerel, *Scomberomorus commersoni*. *Syst. Parasitol.* **4**, 1-6.
- YAMAGUTI, S. (1959) *Systema Helminthum. II. The Cestodes of Vertebrates*. (Interscience Publishers, New York).